

IN THE CLAIMS:

1 Please cancel claims 10, 11, 12, 13 and 14, without prejudice.

1 1-9 cancelled.

1 10. Cancelled

1 11. (Currently Amended) ~~The method as defined in claim 10 including the further steps~~
2 ~~of:~~

3 ~~(A) identifying a weakest cell in a fuel cell stack;~~

4 ~~(B) measuring the output voltage of the weakest cell;~~

5 ~~(C) dynamically determining a desired value for said output voltage;~~

6 ~~(D) comparing a present value of said weakest cell output voltage with a de-~~
7 ~~sired value;~~

8 ~~(E) calculating a new duty cycle for the associated DC-DC converter within~~
9 ~~the fuel cell system required to substantially achieve said desired value for the output~~
10 ~~voltage of the weakest cell; and~~

11 ~~(F) signaling said DC-DC converter to adjust its duty cycle to said new duty~~
12 ~~eyele. A method of dynamically controlling and managing operating characteristics of a~~
13 ~~fuel cell system, including the steps of:~~

14 ~~(A) providing a DC-DC converter circuit having an input connection to re-~~
15 ~~ceive the output of a fuel cell, and connected to place a load across the fuel cell, said DC-~~
16 ~~DC converter circuit having internal switches that are operated at a duty cycle that is ad-~~
17 ~~justable;~~

18 ~~(B) providing a programmable controller that receives as an input, present and~~
19 ~~stored values of one or more operating characteristics, said programmable controller also~~
20 ~~being programmed to signal said DC-DC converter switches to adjust its duty cycle;~~

- 21 (C) dynamically determining a desired value for one or more operating charac-
22 teristics of the fuel cell system, depending upon the operating conditions of the fuel cell
23 system, including determining a minimum fuel cell output voltage as said desired value;
24 (D) identifying a weakest cell in a fuel cell sack;
25 (E) measuring the output voltage of the weakest cell;
26
27 (F) dynamically determining a desired value for said output voltage;
28 (G) comparing a present value of said weakest cell output voltage with a de-
29 sired value;
30 (H) calculating a new duty cycle for the associated DC-DC converter within
31 the fuel cell system required to substantially achieve said desired value for the output
32 voltage of the weakest cell; and
33 (I) signaling said DC-DC converter to adjust its duty cycle to said new duty
34 cycle.

1 12. Cancelled

1 13. Cancelled

1 14. Cancelled

1 15. (Currently Amended) ~~The method of controlling operating characteristics of a~~
2 ~~fuel cell as defined in claim 10 including the further steps of:~~

3 A method of dynamically controlling and managing operating characteristics of a
4 fuel cell system used to power a battery or an application device, including the steps of:

5 (A) providing a DC-DC converter circuit having an input connection to re-
6 ceive the output of a fuel cell, and connected to place a load across the fuel cell, said DC-
7 DC converter circuit having internal switches that are operated at a duty cycle that is ad-
8 justable;

9 (B) providing a programmable controller that receives as an input, present and
10 stored values of one or more operating characteristics, said programmable controller also
11 being programmed to signal said DC-DC converter switches to adjust its duty cycle;

12 (C) dynamically determining a desired value for one or more operating charac-
13 teristics of the fuel cell system, depending upon the operating conditions of the fuel cell
14 system;

15 (AD) monitoring as said operating characteristic, the output power of the fuel
16 cell stack;

17 (BE) dynamically determining as said desired value, ~~the~~ an output power of the
18 fuel cell stack that does not exceed a maximum power needed by at least one of the bat-
19 tery or the application device being powered by the system;

20 (CE) comparing a present value of said output power with a desired value;

21 (DG) calculating a new duty cycle for the associated DC-DC converter within
22 the fuel cell system required to substantially achieve said desired value for the output
23 power; and

24 (EH) signaling the DC-DC converter to adjust its duty cycle to said new duty
25 cycle.

1 16. (Previously Presented) A method of controlling a fuel cell system, including the
2 steps of:

3 (A) dynamically determining desired values for a plurality of operating char-
4 acteristics being monitored in a current mode of operation of a fuel cell system;

5 (B) measuring each of said selected operating characteristics;

6 (C) determining a duty cycle required to substantially achieve each individual
7 desired value and storing each duty cycle;

8 (D) comparing stored values and selecting the minimum duty cycle; and

9 (E) using this duty cycle as the new duty cycle of the DC-DC converter circuit
10 switches within said fuel cell system;

1 17. (Previously Presented) The method as defined in claim 16 including the further
2 step of:

3 periodically repeating determining the desired values and the measurements and
4 updating the duty cycle.

1 18. (Currently Amended) A method of measuring fuel cell concentration in a fuel cell
2 system:

- 3 (A) identifying the weakest fuel cell in a fuel cell stack;
4 (B) increasing the overall stack output current and varying the duty cycle of
5 DC-DC converter circuit switches coupled to said fuel cell system until the voltage of the
6 weakest fuel cell approaches zero;
7 (C) measuring the stack output current as a limiting current;
8 (D) determining whether concentration is too high or too low, based on the
9 measured current value; and
10 (E) dosing additional fuel or water should a desired value not be met.

1 19. (Previously Presented) A method of dynamically controlling and managing tem-
2 perature in a fuel cell system, including the steps of:

- 3 (A) measuring the stack output voltage of the fuel cell system;
4 (B) determining whether the stack output voltage is at a desired value depend-
5 ing upon the present desired temperature range of the fuel cell system, for the present op-
6 erating conditions, and
7 (C) adjusting the duty cycle of an associated DC-DC converter to change the
8 output stack voltage to substantially the desired value.

1 20. (Currently Amended) A method of dynamically controlling the output power of a
2 fuel cell system including the steps of:

- 3 (A) dynamically determining a desired value for the output power of the fuel
4 cell system, depending upon the present operating conditions of the fuel cell system;
5 (B) measuring the output power of the fuel cell system;

6 (C) if the desired value is not substantially met, measuring fuel cell concentra-
7 tion;

8 (D) adjusting fuel cell concentration to substantially achieve the desired value
9 of the output power of the fuel cell system; and

10 (E) adjusting the overall stack voltage by adjusting a duty cycle of associated
11 DC-DC converter circuit switches coupled to the fuel cell system to substantially achieve
12 the maximum output power of the fuel cell system.